AQUACULTURE
Curriculum Content Framework

Prepared By
Heath Lee, Ouachita High School
Shannon Lewis, Brinkley High School
Randy Romeo, Conway High School
Jack Still, Blevins High School

Facilitated By
Karen Chisholm, Program Manager
Office of Assessment and Curriculum
Arkansas Department of Workforce Education

Edited By
Angela Collins, Program Advisor
Office of Agriculture Science and Technology
Arkansas Department of Workforce Education

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Curriculum Content Framework

AQUACULTURE

Grade Levels: 10, 11, 12 **Prerequisites: Agriculture Science & Technology or Agriculture Science**
Course Code: 491190

Course Description: This course is the science of water farming. It includes the production and marketing of aquatic animals and plants.

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Unit 1: Introduction & History of the Aquaculture Industry
5 Hours

Terminology: Aquaculture, Bait aquaculture, Brackish water, Captured aquafood, Closed system, Cultured aquacrop, Extensive, Food aquacrop, Freshwater aquacrop, Intensive aquacrop, Mariculture, Monoculture, Omega 3 fatty acids, Open system, Ornamental aquaculture, Polyculture, Production intensity, Raceways, Recreational aquaculture, Seafood, Stock enhancement, Tank, Water enclosure, Water recirculation

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.1 Define terms		Foundation	Reading	Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
			Writing	Applies/Uses technical words and concepts [1.6.4]
				Uses words appropriately [1.6.21]
		Thinking	Knowing how to Learn	Locates appropriate learning resources to acquire new skills or improve skills [4.3.3]
				Processes new information as related to workplace [4.3.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.2 List the uses of aquacrops		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6] Determines what information is needed [1.3.10] Interprets drawings to obtain factual information [1.3.17]
		Thinking	Seeing Things in the Mind's Eye	Imagines the flow of work activities from narrative descriptions [4.6.1] Organizes and processes images –symbols, pictures, graphs, objects, etc. [4.6.2] Visualizes a system's operation from schematics [4.6.3] Visualizes a finished product [4.6.4]
1.3 Identify production levels		Foundation	Speaking	Participates in conversation, discussion, and group presentations [1.5.8] Responds to listener feedback [1.5.10]
		Interpersonal	Cultural Diversity	Discusses contributions and innovations made by women and/or minority groups [2.2.2]
		Thinking	Creative Thinking	Develops visual aids to create audience interest [4.1.4]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.4 Identify common facilities		Foundation	Reading	Adjusts reading strategy to purpose and type of reading (skimming and scanning) [1.3.1] Identifies relevant details, facts, and specifications [1.3.16] Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
		Personal Management	Career Awareness, Development, & Mobility	Develops skills to locate, evaluate, and interpret career information [3.1.4] Explores career opportunities [3.1.6] Identifies education and training needed to achieve goals [3.1.8]
1.5 Outline aquaculture systems		Foundation	Reading	Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
			Writing	Applies/Uses technical words and concepts [1.6.4] Uses words appropriately [1.6.21]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.6 Discuss the history of early fish farming		Foundation	Reading	Adjusts reading strategy to purpose and type of reading (skimming and scanning) [1.3.1] Identifies relevant details, facts, and specifications [1.3.16] Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
1.7 Discuss opportunities provided by FFA for students interested in aquaculture	1.7.1 Research a career in the aquaculture industry to determine education requirements, working conditions, and salaries of those working in aquaculture	Personal Management	Career Awareness, Development, & Mobility	Develops skills to locate, evaluate, and interpret career information [3.1.4] Explores career opportunities [3.1.6] Identifies education and training needed to achieve goals [3.1.8]

Unit 2: Aquaculture Biology
15 Hours

Terminology: Animalia, Anterior, Arteries, Carbohydrate, Dorsal, Fat, Fungi, Gills, Habitat, Lateral, Monera, Osteichthyes, Plantae, Posterior, Proteins, Prostista, Spawn, Taxonomic name, Taxonomy, Veins, Ventral, Vitamins

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.2 Discuss the five taxonomic kingdoms		Foundation	Science	Acquires and processes scientific data [1.4.1] Analyzes environmental issues (ecology, pollution, waste management) [1.4.2] Constructs hypothesis [1.4.11]
		Thinking	Problem Solving	Solves practical problems using scientific methods and techniques [1.4.23]
			Reasoning	Demonstrates logical reasoning in reaching a conclusion [4.4.2] Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5] Sees relationship between two or more ideas, objects, or situations [4.5.5] Uses logic to draw conclusions from available information [4.5.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.3 Describe body systems	2.3.1 Research one aquatic species to determine its habitat and nutrition requirements and its marketability	Foundation	Science	Acquires and processes scientific data [1.4.1] Analyzes environmental issues (ecology, pollution, waste management) [1.4.2] Constructs hypothesis [1.4.11]
		Thinking	Problem Solving	Solves practical problems using scientific methods and techniques [1.4.23]
			Reasoning	Demonstrates logical reasoning in reaching a conclusion [4.4.2] Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5] Sees relationship between two or more ideas, objects, or situations [4.5.5] Uses logic to draw conclusions from available information [4.5.6]
2.4 Name the parts of the nervous system		Foundation	Science	Applying knowledge learned through study and practice that is based on scientific principles, methods, and techniques.[1.4.3]
			Speaking	Adapts presentation to audience [1.5.1]
2.5 Discuss the circulatory and sensory systems		Foundation	Science	Applies scientific principles related to water quality [1.4.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.6 Describe the respiratory system		Foundation	Science	Acquires and processes scientific data [1.4.1] Analyzes environmental issues (ecology, pollution, waste management) [1.4.2] Constructs hypothesis [1.4.11]
		Thinking	Problem Solving	Solves practical problems using scientific methods and techniques [1.4.23]
			Reasoning	Demonstrates logical reasoning in reaching a conclusion [4.4.2] Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5] Sees relationship between two or more ideas, objects, or situations [4.5.5] Uses logic to draw conclusions from available information [4.5.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.7 Discuss the digestive system and mouth positions	2.7.1 Dissect a fish to view an actual digestive system	Foundation	Listening	Evaluates oral information/presentation [1.2.2] Listens for content [1.2.3] Receives and interprets verbal messages [1.2.8] Responds nonverbally to conversation [1.2.9]
		Personal Management	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2] Follows established rules, regulations, and policies [3.2.5]
			Organizational Effectiveness	Adapts to the organization's goals, values, culture, and traditional modes of operation [3.3.1] Applies knowledge to implement work-related system or practice [3.3.4] Comprehends the organization's modes of operation [3.3.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.8 Describe five habitats and the reproduction process of fish		Foundation	Reading	Applies/understands technical words that pertain to subject [1.3.6] Determines what information is needed [1.3.10] Interprets drawings to obtain factual information [1.3.17]
		Thinking	Seeing Things in the Mind's Eye	Imagines the flow of work activities from narrative descriptions [4.6.1] Organizes and processes images –symbols, pictures, graphs, objects, etc. [4.6.2] Visualizes a system's operation from schematics [4.6.3] Visualizes a finished product [4.6.4]
2.9 List the nutritional requirements needed by fish		Foundation	Listening	Evaluates oral information/ presentation [1.2.2] Listens for content [1.2.3]

Unit 3: Water Considerations & Facilities
10 Hours

Terminology: Aquaria, Aquifer, Artesian well, Cage, Closed raceway, Dissolved oxygen, Ectothermic, Gallons per minute (GPM), Hardness, Impoundments, Industrial effluent, Open raceway, Pen, Pollutant, Pond, Spring, Stream, Surface runoff, Vat, Water cycle, Water pH, Water quality, Well

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
3.2 Discuss the surface area of water and its salinity		Foundation	Science	Analyzes environmental issues (ecology, pollution, water management) [1.4.2] Follows safety guidelines [1.4.16] Solves practical problems using scientific methods and techniques [1.4.23]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2] Takes an interest in what others say and do [2.6.5]
		Thinking	Problem Solving	Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.3 Discuss the largest uses of fresh water		Foundation	Reading	Comprehends written specifications and applies them to a task [1.3.9]
		Interpersonal	Career Awareness, Development, & Mobility	Analyzes impact of work on individual and family life [3.1.1]
3.4 Describe the water cycle		Foundation	Science	Analyzes environmental issues (ecology, pollution, water management) [1.4.2]
				Follows safety guidelines [1.4.16]
				Solves practical problems using scientific methods and techniques [1.4.23]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2]
				Takes an interest in what others say and do [2.6.5]
		Thinking	Problem Solving	Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]
3.5 Describe aquaculture facilities		Foundation	Listening	Comprehends ideas and concepts related to water quality [1.2.1]
		Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.6 Discuss types of tanks		Foundation	Speaking	Adapts presentation to audience [1.5.1]
		Thinking	Creative Thinking	Makes connections between seemingly unrelated ideas [4.1.6]
3.7 Describe aquaculture farming methods	3.7.1 Visit a site to show the difference in each growing item	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]
3.8 List the sources of water		Foundation	Science	Applies scientific principles related to water quality [1.4.5]
3.9 Explain how well production is measured (GPM)		Foundation	Science	Applies knowledge learned through study and practices that is based on techniques
3.10 List water quality factors	3.10.1 Sample water from a pond to determine quality	Foundation	Science	Analyzes environmental issues (ecology, pollution, waste management) [1.4.2]
		Thinking	Seeing Things in the Mind's Eye	Visualizes a system's operation from schematics [4.6.3]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.11 Describe the impacts that dissolved oxygen, temperature, pH, and hardness have on water quality	3.11.1 Demonstrate methods of correcting dissolved oxygen deficiency	Foundation	Science	Applies knowledge to complete a practical task [1.4.3] Chooses appropriately from a variety of scientific methods and techniques to complete a task [1.4.9] Converts quantities and measurements from one form to another [1.4.13] Monitors variables in experiment [1.4.18]
		Thinking	Creative Thinking	Finds new ways of dealing with existing problems/situations [4.1.5] Prepares presentation based on subject research, interviews, surveys [4.1.10]
			Problem Solving	Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]
3.12 Explain how temperature affects dissolved oxygen		Foundation	Reading	Comprehends written specifications, and applies them to a task [1.3.9]
		Interpersonal	Career Awareness, Development, & Mobility	Analyzes impact of work on individual and family life [3.1.1]

Unit 4: Water Quality Characteristics & Equipment
15 Hours

Terminology: Aeration, Ammonia, Biological oxygen demand, Biological weed control, Chemical weed control, Environmental weed control, Mechanical weed control, Oxygenation, Oxygen depletion, Turbidity

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
4.2 List water quality characteristics and equipment	4.2.1 Sample water from a pond to determine quality	Foundation	Science	Analyzes environmental issues (ecology, pollution, water management) [1.4.2] Follows safety guidelines [1.4.16] Solves practical problems using scientific methods and techniques [1.4.23]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2] Takes an interest in what others say and do [2.6.5]
		Thinking	Problem Solving	Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.3 Explain what controls water's physical characteristics		Foundation	Science	Analyzes environmental issues (ecology, pollution, waste management) [1.4.2]
		Thinking	Seeing Things in the Mind's Eye	Visualizes a system's operation from schematics [4.6.3]
4.4 List the common signs of oxygen depletion		Foundation	Science	Applies scientific principles related to water quality [1.4.5]
4.5 List the causes of oxygen depletion		Foundation	Science	Applies scientific principles related to water quality [1.4.5]
4.6 Explain how oxygen depletion can be fixed		Foundation	Science	Applies scientific principles related to water quality [1.4.5]
4.7 List methods of getting dissolved oxygen into water		Foundation	Reading	Determines what information is needed [1.3.10]
				Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Adapts notes to a proper form [1.6.1]
				Summarizes written information [1.6.17]
				Writes/Prints legibly [1.6.24]
		Thinking	Creative Thinking	Combines ideas or information in new way [4.1.2]
				Makes connections between seemingly unrelated ideas [4.1.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.8 Determine the causes of turbidity		Foundation	Listening	Comprehends ideas and concepts related to water quality [1.2.1]
		Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]
4.9 Describe the methods used to control turbidity		Foundation	Listening	Comprehends ideas and concepts related to water quality [1.2.1]
		Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]
4.10 Determine how many gallons of water are in one cubic foot		Foundation	Arithmetic/ Mathematics	Applies a mathematical formula to solve a problem [1.1.3]
				Calculates percentages, ratios, proportions, decimals, and common fractions [1.1.10]
				Computes using a formula [1.1.14]
		Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]
				Exerts a high level of effort and perseverance toward goal attainment [3.4.4]
				Sets high standards for self in completion of a task [3.4.9]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.11 Determine the number of gallons of water in an acre foot of water		Foundation	Arithmetic/ Mathematics	Applies a mathematical formula to solve a problem [1.1.3] Calculates percentages, ratios, proportions, decimals, and common fractions [1.1.10] Computes using a formula [1.1.14]
		Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3] Exerts a high level of effort and perseverance toward goal attainment [3.4.4] Sets high standards for self in completion of a task [3.4.9]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.12 Explain how to calculate the volume of a rectangular tank and a round tank	4.12.1 Calculate the volume of a rectangular or round tank	Foundation	Arithmetic/ Mathematics	Applies a mathematical formula to solve a problem [1.1.3] Calculates percentages, ratios, proportions, decimals, and common fractions [1.1.10] Computes using a formula [1.1.14]
		Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3] Exerts a high level of effort and perseverance toward goal attainment [3.4.4] Sets high standards for self in completion of a task [3.4.9]
4.13 Explain the methods of weed control		Foundation	Speaking	Participates in conversation, discussion, and group presentations [1.5.8]
		Interpersonal	Negotiation	Comprehends ideas and concepts related to structures and equipment [2.5.2]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.14 Determine the percentages of nitrogen and oxygen in an atmosphere		Foundation	Arithmetic/ Mathematics	Applies a mathematical formula to solve a problem [1.1.3] Calculates percentages, ratios, proportions, decimals, and common fractions [1.1.10] Computes using a formula [1.1.14]
		Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3] Exerts a high level of effort and perseverance toward goal attainment [3.4.4] Sets high standards for self in completion of a task [3.4.9]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.15 List the most common nitrogen compounds in water		Foundation	Reading	Determines what information is needed [1.3.10] Identifies relevant details, facts, and specifications [1.3.16]
			Writing	Adapts notes to a proper form [1.6.1] Summarizes written information [1.6.17] Writes/Prints legibly [1.6.24]
		Thinking	Creative Thinking	Combines ideas or information in new way [4.1.2] Makes connections between seemingly unrelated ideas [4.1.6]

Unit 5: Disease & Pest Management
15 Hours

Terminology: Abscess, Dipping, Direct pest losses, Disease, External parasite, Feed additive, Indirect disease losses, Internal parasite, Lesion, Parasite, Pest, Predator, Quarantine, Sanitation, Trash fish, Vigor

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.2 Explain how an aquaculture environment may be a good place for pests	5.2.1 Interview a fish producer about his or her health management practices	Foundation	Listening	Listens for content [1.2.3] Listens to follow directions [1.2.6] Listens for long-term contexts [1.2.7]
			Writing	Checks, edits, and revises document for correct information, appropriate emphasis, form, grammar, spelling, and punctuation [1.6.5] Summarizes written information [1.6.17] Uses language, style, organization, and format appropriate to subject matter, purpose, and audience [1.6.19]
		Personal Management	Self-esteem	Creates self-confidence by creating a resume that promotes personal strengths/abilities [3.5.3] Presents positive image of personal attitudes and abilities [3.5.7]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.3 Explain how direct losses occur in aquaculture (spontaneous and indirect)		Foundation	Science	Analyzes environmental issues (ecology, pollution, waste management) [1.4.2] Constructs graph of data [1.4.10] Records data related to treating fish diseases [1.4.22]
		Thinking	Decision Making	Considers risks when making a decision [4.2.3] Evaluates information/data to make best decision [4.2.5] Identifies pros and cons to assist in decision-making process [4.2.7]
5.4 List the common signs of disease in aqua crops		Foundation	Science	Applies a scientific principle to solve a problem [1.4.8] Constructs graph of data [1.4.10]
		Thinking	Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2] Draws conclusions from what is read, and gives possible solutions [4.4.4] Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.5 Discuss good aquacultural practices that aid in disease prevention	5.5.1 Observe sites where poor water quality has affected aquatic life	Foundation	Science	Acquires and processes scientific data [1.4.1] Applies knowledge to complete a practical task [1.4.3]
			Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5] Organizes ideas, and communicates oral messages to listeners [1.5.7] Participates in conversation, discussion, and group presentations [1.5.8]
		Thinking	Creative Thinking	Prepares presentation based on subject research, interviews, surveys [4.1.10]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.6 List the methods of controlling aquatic plants		Foundation	Reading	Applies information to job performance [1.3.4] Applies/Understands technical words that pertain to subject [1.3.6] Interprets drawings to obtain factual information [1.3.17]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2] Works effectively with others to reach a common goal [2.6.6]
		Thinking	Knowing how to Learn	Uses available resources to acquire new skills or improve skills [4.3.4] Processes new information as related to workplace [4.3.5]

Unit 6: Marketing
20 Hours

Terminology: Advertising, Basic processing, Deheading, Dressed, Eviscerating, Eyed eggs, Fry, Fingerling, Fillet, Grading, Live hauling, Live product form, Marketing, Marketing channel, Processing, Skinning

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
6.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
6.2 Develop an advertising campaign for a type of aquaculture product	6.2.1 Interview someone in the aquaculture business to learn more about management practices	Foundation Interpersonal	Speaking Customer Service	Uses verbal language and other cues, such as body language, appropriate in style, tone, and level of complexity to the audience and the occasion [1.5.14] Comprehends ideas and concepts related to marketing aquatic products [2.3.2]
6.3 Explain the different aquaculture marketing channels		Foundation Thinking	Math Knowing how to Learn	Applies mathematical principles related to marketing aquatic products [1.1.4] Applies new knowledge and skills to marketing aquatic products [4.3.1]
6.4 Describe live aquaculture product forms	6.4.1 Develop a marketing plan	Foundation Thinking	Writing Creative Thinking	Organizes information in an appropriate format [1.6.10] Combines ideas or information in new way [4.1.2]
6.5 Explain the “dressing” process in the aquaculture industry		Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
		Personal Management	Responsibility	Pays close attention to details [3.4.8]
6.6 Evaluate the types of processed forms and cuts of fish		Foundation	Speaking	Organizes ideas, and communicates oral messages to listeners [1.5.7]
		Personal Management	Responsibility	Exerts a high level of enthusiasm in approaching and completing tasks [3.4.3]

Glossary

Unit 1: Introduction & History of the Aquaculture Industry

1. Aquaculture—the production of aquatic plants, animals, and other species
2. Bait aquaculture—raising of small fish and other species for use as bait
3. Brackish water—mixture of fresh and salt water
4. Captured aquafood—plants, animals, and other species that grow in the wild and are caught for human use
5. Closed system—an aquaculture system that uses filters and pumps to recycle the water and minimize water usage
6. Cultured aquacrop—a species of aquatic organism that is raised in a somewhat controlled environment
7. Extensive—production systems with low population density
8. Food aquacrop—an aquatic species produced almost exclusively for human food
9. Freshwater aquacrop—growing aquatic organisms in fresh water
10. Intensive aquacrop—producing aquacrops at a high population density
11. Mariculture—producing aquatic crops in salt water
12. Monoculture—production system in which only one species is grown at a time
13. Omega 3 fatty acids—a food benefit from eating fish that helps prevents cholesterol problems in humans
14. Open system—an aquaculture system in which water is pumped into and out of the system for disposal
15. Ornamental aquaculture—keeping fish and other aquatic species for aesthetic or personal appeal
16. Polyculture—an aquaculture system in which two or more species are grown together
17. Production intensity—density of the aquacrop in its water facility
18. Raceways—long, narrow water enclosures that use flowing water

19. Recreational aquaculture—raising aquatic species for sporting purposes

20. Seafood—edible marine fish, shellfish, and other aquatic species that may be wild or cultured

21. Stock enhancement—raising wild species in captivity for release into natural water; used to keep species from being depleted

22. Tank—a round or rectangular water container used for aquaculture

23. Water enclosure—a facility in which aquaculture takes place

24. Water recirculation—pumping water back through an aquaculture system

Unit 2: Aquaculture Biology

1. Animalia—kingdom containing multicellular animals; fish and other aquatic organisms belong to this kingdom
2. Anterior—the front end of a fish
3. Arteries—vessels that carry blood from the heart
4. Carbohydrate—food nutrient that provides energy; found in sugar, starch, and cellulose
5. Dorsal—the back plane of a fish
6. Fat—food nutrient comprised of fatty acids that help maintain health and proper growth
7. Fungi—kingdom that contains true fungi, plants that do not produce their own food
8. Gills—blood-filled membranes used by fish and other organisms to remove oxygen from the water
9. Habitat—an environment in which an organism lives and thrives
10. Lateral—the side plane of a fish
11. Monera—kingdom that contains very primitive organisms, cells without membranes such as bacteria and blue-green algae
12. Osteichthyes—scientific class that includes all fish that are important in aquaculture
13. Plantae—kingdom composed of plants that produce their own food through photosynthesis
14. Posterior—the tail end of a fish
15. Proteins—feed nutrient made of amino acids
16. Protista—kingdom that contains single-celled and very primitive multicelled organisms, such as slime molds and protazoa
17. Spawn—the reproductive process in fish
18. Taxonomic name—the scientific name of a species based on its genus and species
19. Taxonomy—scientific classification system for arranging organisms into groups
20. Veins—vessels that carry blood to the heart

21. Ventral—the belly side of a fish

22. Vitamins—an organic substance necessary for proper nutrition

Unit 3: Water Considerations & Facilities

1. Aquaria—small, usually glass, tanks used for aquaculture, most often for ornamentals
2. Aquifer—an underground formation of sand, gravel, or rock that contains water
3. Artesian well—a well that produces water without pumping; the water is forced out by natural pressure
4. Cage—a container for aquacrops that floats in the water, often used when other methods will not work
5. Closed raceway—raceway in which the water is recycled
6. Dissolved oxygen—the free oxygen in water that is available to aquatic organisms
7. Ectothermic—an animal whose body temperature changes with changes in its environment
8. Gallons per minute [GPM]—number of gallons of water a well can produce in a minute
9. Hardness—amount of calcium and magnesium in water
10. Impoundments—enclosures that hold water for aquaculture
11. Industrial effluent—water released by manufacturing plants
12. Open raceway—a raceway in which the water is used once and then removed from the system
13. Pen—an enclosure, usually a net that is attached to the bottom of a lake, pond, etc.
14. Pollutant—a substance that damages or degrades water, air, soil, or any part of the environment
15. Pond—an artificial water impoundment made of soil
16. Spring—a natural opening in the earth that produces water
17. Stream—a flowing body of water, smaller than a river
18. Surface runoff—water from precipitation that does not soak into the soil
19. Vat—a long, rectangular water impoundment similar to a tank, usually made of concrete and not mobile
20. Water cycle—the never ending circulation of the earth’s water

21. Water pH—the acidity or alkalinity of water

22. Water quality—the suitability of water for a particular use

23. Well—an opening made in the earth to obtain water

Unit 4: Water Quality Characteristics & Equipment

1. Aeration—exposing water to air so it will pick up oxygen
2. Ammonia—a form of nitrogen found in water that is most toxic to fish
3. Biological oxygen demand—amount of oxygen used by organisms, decay processes, and other functions in water
4. Biological weed control—using plant-eating organisms to control weeds
5. Chemical weed control—using herbicides to control weeds
6. Environmental weed control—using environmental and facility design factors to control weeds
7. Mechanical weed control—physically cutting or pulling weeds as a control method
8. Oxygenation—adding dissolved oxygen to water, using mechanical, chemical, or other means
9. Oxygen depletion—occurs when the level of oxygen in water drops below the level needed to maintain living conditions for an aquacrop
10. Turbidity—presence of particles in the water that make it appear cloudy or unclear

Unit 5: Disease & Pest Management

1. Abscess—a swollen area in body tissue that contains pus
2. Dipping—treating a disease by immersing an organism in a therapeutic solution for a short time
3. Direct pest losses—losses resulting when organisms are attacked, injured, or killed
4. Disease—unhealthy; a condition that impairs an organism
5. External parasite—a parasite that lives on the outside of the body of its host
6. Feed additive—substances added to feed; may include medications, vitamins, and other items put into feed for a specific purpose
7. Indirect disease losses—losses of aquacrops resulting from an environment that is less than ideal
8. Internal parasite—a parasite that lives in the organs, digestive tract, or other places inside of its host
9. Lesion—a cut or other injury that creates wounds
10. Parasite—an organism that lives in or on another organism (the host), depends on the host for its food, has a higher reproductive potential than the host, and may harm the host when present in large numbers
11. Pest—an organism that is detrimental or interferes with other organisms or facilities
12. Predator—an animal that attacks and feeds on other animals
13. Quarantine—isolating organisms from each other
14. Sanitation—keeping facilities clean, and using clean water for aquaculture
15. Trash fish—undesirable fish in a crop of fish
16. Vigor—movement of organisms typical for their species

Unit 6: Marketing

1. Advertising—calling the attention of possible consumers to a product, and encouraging them to buy it
2. Basic processing—steps in fish processing that include deheading, eviscerating, and skinning; also known as dressing
3. Deheading—removing the head of fish
4. Dressed—killed and prepared for food market
5. Eviscerating—removing the internal organs; also known as gutting
6. Eyed eggs—fertile eggs beginning to show the development of the fish embryo
7. Fry—the stage in a fish's life from the time it hatches until it reaches one inch (2.5 cm) in length
8. Fingerling—the stage in a fish's life between one inch (2.5 cm) and one year of age
9. Fillet—high quality piece of fish made by cutting parallel with the backbone so the product does not contain bones
10. Grading—sorting aquacrops into batches of uniform size and species
11. Live hauling—transporting live aquacrops to others who will use them in free lakes or for other purposes
12. Live product form—marketing aquacrops that are alive
13. Marketing—providing consumers with the products they desire
14. Marketing channel—the steps or procedure followed to get a product to the consumer
15. Processing—preparing an aquacrop into a convenient form for the consumer; includes preserving products to prevent spoilage
16. Skinning—removing the skin from fish during processing